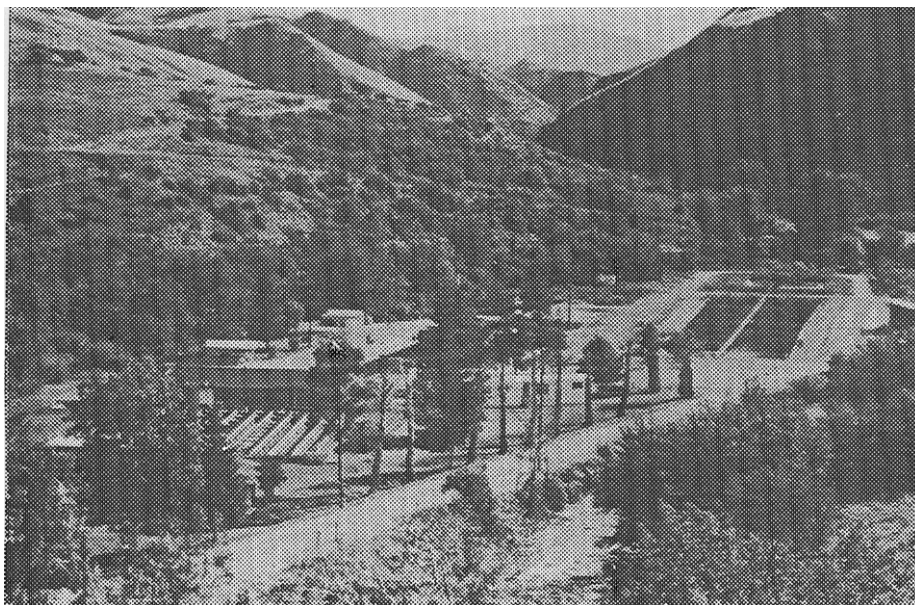




RAPID RIVER FISH HATCHERY

Brood Year 1991



by

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ABSTRACT

The Rapid River adult trap was in operation from March 21 through September 19, 1991. During this time, 1,913 spring chinook Oncorhynchus tshawytscha were collected. This total was comprised of 1,675 adults and 238 jacks. Incidentally trapped summer chinook, totaling 141 adults and 12 jacks, were released back into Rapid River above the hatchery's water intake structure. Additionally, there were 47 adult steelhead O. mykiss trapped. Of these, 1 was of hatchery origin and 46 were wild. All wild steelhead were released above the hatchery's water intake structure, and all hatchery steelhead were transported to the Little Salmon River and released. Also trapped and released above the hatchery were 326 bull trout Salvelinus confluentus and 5 whitefish Coregonus sp. No Rapid River spring chinook stock trapped in Hells Canyon were returned to Rapid River Hatchery this year.

Prespawning mortality for Rapid River spring chinook was 183 fish (9.9%). Spawning operations began on August 13 and continued through September 17, 1991. A total of 657 females were spawned which had an average fecundity of 3,886 eggs per female. These fish yielded approximately 2,553,218 green eggs, with 94.5% survival to eye-up. Approximately 22,235 green eggs and 26,694 eyed eggs were received from Pahsimeroi Hatchery and Oregon's Lookingglass Hatchery, respectively.

Approximately 2,422,000 swim-up fry were moved into five raceways for early rearing during the period January 16 through March 5, 1992. Approximately 3,050 fry were transported to Hayden Creek experimental channels on May 15, 1992. All spring chinook reared for smolt release received an adipose fin clip and coded wire tag (CWT). During this process, June 8 through July 2, 1992, a physical count inventory was obtained as spring chinook were marked from raceways into rearing ponds. Initial final rearing pond loading was 2,299,023 spring chinook fry. An additional 100,367 spring chinook were reared in raceways until July 23, 1992, at which time they were outplanted in Squaw Creek and White Sands Creek for supplementation. Final rearing culminated in the release of 2,060,300 smolts into Rapid River and 200,300 smolts into the Snake River below Hells Canyon Dam.

Overall feed conversion for the 1991 brood year spring chinook was 1.72:1. The cost per pound of 1991 brood year fish produced at Rapid River Hatchery was \$7.36 (\$0.298 per smolt released).

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INTRODUCTION

Funding Source

Rapid River Hatchery was constructed in 1964 by Idaho Power Company (IPC) to mitigate for losses of spring chinook salmon Oncorhynchus tshawytscha resulting from the construction of Brownlee, Oxbow, and Hells Canyon dams on the Snake River. Mitigation, as required by the Federal Energy Regulatory Commission, required IPC to transplant the run of spring chinook salmon from the Snake River to the Salmon River drainage and to provide funds for the production of 3 million spring chinook salmon smolts annually. These fish are designated for release into Rapid River and the Snake River below Hells Canyon Dam.

Location

Rapid River Hatchery is located in Idaho County, approximately seven miles southwest of the community of Riggins, Idaho on Rapid River, a tributary of the Little Salmon River. Travel distance of spring chinook salmon leaving or returning from the ocean is approximately 600 river miles. Rapid River Hatchery is staffed and operated by the Idaho Department of Fish and Game (IDFG) and is completely funded by IPC.

Species reared

Rapid River Hatchery raises spring chinook salmon. Historic rearing data has been compiled in the appendices.

OBJECTIVES

The objectives of Rapid River Hatchery are:

1. To annually produce 3 million spring chinook salmon smolts. The average size is to be approximately 20 fish/pound (44.1/kg). These fish are to be released into Rapid River and the Snake River below Hells Canyon Dam.
2. To trap and spawn adult spring chinook salmon returning to Rapid River.
3. To evaluate various strategies and techniques for rearing spring chinook salmon.
4. To provide eggs and/or fry for supplementation purposes.

FACILITY DESCRIPTION

Fish rearing facilities at Rapid River Hatchery consist of 50 double stack Heath incubator trays, 12 outdoor concrete raceways (6-ft x 90-ft), and 2 earthen rearing ponds with concrete side walls: Pond 1AB (84-ft x 199-ft), Pond 2AB (36-ft x 371-ft), and Pond 2CD (36-ft x 371-ft). One concrete adult holding pond (80-ft x 25-ft) and two earthen rearing ponds, Adult Pond #2 (40-ft x 150-ft) and Adult Pond #3 (80-ft x 250-ft), provide space for holding up to 10,000 adult

spring chinook salmon for spawning. Production capacities by unit are listed in Table 1. Rearing space by unit is shown in Table 2.

The adult trapping facility is located on Rapid River approximately 1.5 miles downstream from the hatchery. It is equipped with a permanent wooden velocity barrier, a three-step fish ladder, and a two-stage trap. Adult salmon are transferred from the trap to a 1,000-gallon tank truck for transport to the hatchery by means of an Alaska Steep Pass ladder and a 500-gallon bucket operated by an overhead hoist.

WATER SUPPLY

Water source

From its origin in Adams County, Rapid River flows through a pristine canyon before reaching the hatchery. Under inclusion in the Wild and Scenic Rivers Act, the Rapid River drainage has not been subject to perturbations, such as logging and road building, and consequently provides an excellent water source for rearing spring chinook salmon. The length and steep nature of Rapid River's drainage make it a highly variable river. Spring runoff and flash floods can be violent and carry a tremendous volume of silt into the hatchery. In winter, flows decline as the upper part of the drainage freezes and ice blocks the river. The water temperature is also quite variable. The minimum in January is about 34°F and the maximum in August can exceed 60°F.

Water supply

Hatchery water is obtained through one 30-inch and one 24-inch pipeline. 5-foot high wooden diversion dam provides the necessary hydraulic head to supply the hatchery with approximately 30 cubic feet per second (cfs) of water. Rearing units operate on gravitational flow. Water for the incubation system is pumped from the headrace by one of two 7.5-horsepower electric pumps. A gasoline-operated pump and a gravitational flow filter bed provide water during electrical failures. Water quality parameters are listed in Table 3.

STAFFING

The permanent hatchery staff consists of a Fish Hatchery Superintendent III, a Fish Hatchery Superintendent I, and a Fish Culturist. Approximately five seasonal employees are hired each year from February through November. The Summer Youth Employee Training Program also provides one or two employees to assist with grounds maintenance, etc. Housing accommodations include three residences for the permanent staff and a mobile home for seasonal employees.

Table 1. Rapid River Hatchery production capacity data.

Rearing/Holding area	Volume	Carrying capacity
Incubators	768 trays	7,700,000 eggs
Raceways (12)	1,890 cubic ft	500,000 fry
Rearing Pond #	157,600 cubic	1,000,000 smolts
Rearing Pond #2	82,000 cubic	2,000,000 smolts
Adult Pond #1	12,000 cubic	1,000 adults
Adult Pond #2	24,000 cubic	3,000 adults
Adult Pond #3	80,000 cubic	6,000 adults

Table 2. Rapid River Hatchery rearing/holding area volumes.

Rearing/Holding area	Volume (cubic ft)
Rearing Pond #1A	28,000
Rearing Pond #1B	28,800
Rearing Pond #2A	21,700
Rearing Pond #2B	19,300
Rearing Pond #2C	19,300
Rearing Pond #2D	21,700
Adult Pond #1	12,000
Adult Pond #2	24,000
Adult Pond #3	80,000

Table 3. Water quality analysis, Rapid River, September 1991.

Parameter	Observed level	
Alkalinity	66.0	mg/L
Hardness	69.0	mg/L
Arsenic	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.10	mg/L
Mercury	<0.0005	mg/L

FISH PRODUCTION

Adult collection

Spring Chinook Salmon Returns to Rapid River

The adult trapping facility was in operation from March 21 through September 19, 1991. Spring chinook salmon totaling 1,913 (1,675 adults and 238 jacks) were collected between May 21 through August 17, 1991, with the peak of the run occurring June 23 through 30, 1991 (Table 4, Figure 1).

The sex composition ratio of the run was composed of 916 adult males (47.9%), 759 females (39.7%), and 238 jacks (12.4%). Age class composition, determined by fork length measurement (Table 5), indicated 238 three-year-olds (12.4%), 1,254 four-year-olds (65.6%), and 421 five-year-olds (22.0%).

All spring chinook salmon were transported to the hatchery after being injected, checked for injuries, and measured to the nearest centimeter fork length. Table 5 lists fork length for the 1991 spring chinook run, and Figure 2 shows the length frequency histogram. Scale samples were taken from a cross-section of 200 spring chinook for analysis.

Throughout the trapping period, a total of 483 injuries were documented. These injuries were comprised of 20 gaff wounds, 190 nitrogen burns, 231 gill net scars, and 42 injuries of unknown origin. Spring chinook with multiple injuries had each injury recorded separately. All injuries were treated with a direct application of fungicide to help reduce prespawning mortality. There were 19 trapping/handling mortalities recorded during this season (8 adult males, 6 females, and 5 jacks).

Snouts from 143 adipose-clipped, coded-wire-tagged (CWT) spring chinook salmon were collected and sent to the Lewiston Laboratory this year for data analysis. Snouts collected came from 15 jacks (brood year 1988), 100 four-year-olds (brood year 1987), and 28 five-year-olds (brood year 1986). These fish were tagged as part of the US/Canada agreement to determine Idaho's contribution to the ocean harvest.

Hells Canyon Spring Chinook Salmon Returns

No chinook salmon were transported from the IPC Oxbow/Hells Canyon project this year. Data pertaining to the chinook salmon run below Hells Canyon Dam is available in the annual report from Oxbow Hatchery.

Inventory of Miscellaneous Species

All salmon entering the trap after August 10, 1991 were classified as summer chinook, except for adipose-clipped fish. A total of 153 summer chinook salmon (141 adults and 12 jacks) entered the Rapid River trap from July 7 through September 19, 1991 (Table 4). The sex composition ratio was 109 adult males (71.2%), 32 females (20.9%), and 12 jacks (7.8%). These fish were measured to the nearest centimeter fork length and released back into Rapid River upstream from the hatchery water intake structure. Length frequencies for summer chinook are shown in Table 6 and Figure 3. Scale samples were taken from all summer chinook trapped.

Table 4. Run timing of spring chinook to the Rapid River trap, 1991.

Date		Number of fish	Percentage of total run
May	16-22	4	0.2
	23-31	41	2.1
Jun	01-07	45	2.4
	08-15	161	8.4
	16-22	334	17.5
	23-30	472	24.7
Jul	01-07	299	15.6
	08-15	200	10.5
	16-22	176	9.2
	23-31	143	7.5
Aug	01-07	30	1.6
	08-15	7	0.4
	16-22	1	0.1
Run total		1,913	100.2

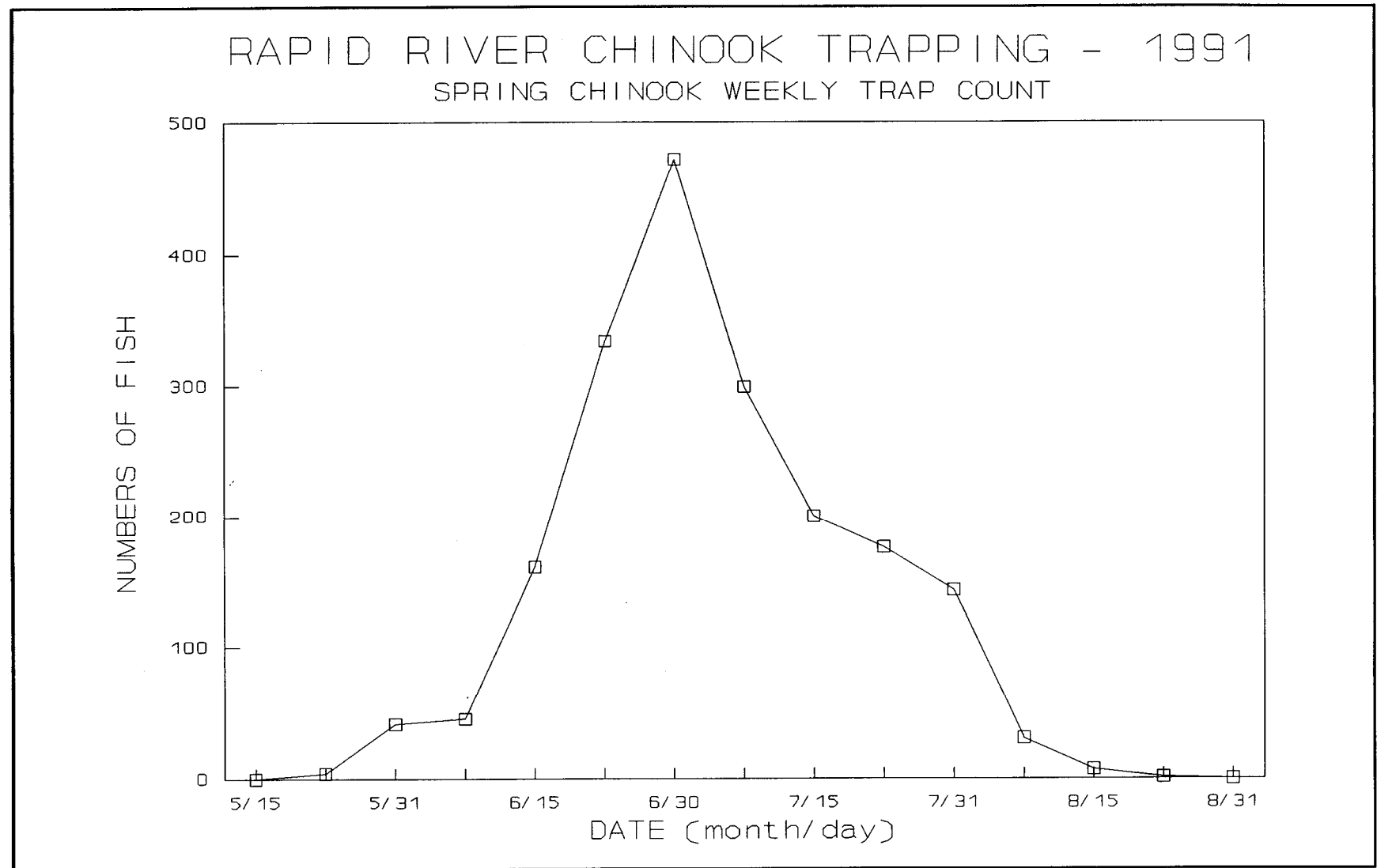


Figure 1. Run timing of spring chinook returns to Rapid River, 1991.

Table 5. Rapid River spring chinook length frequency data, 1991.

Fork Length (cm)	Number of fish	Fork length (cm)	Number of fish
Less than 40		80	29
40	3	81	34
41	5	82	52
42	14	83	50
43	14	84	56
44	19	85	47
45	32	86	35
46	19	87	40
47	26	88	22
48	24	89	27
49	31	90	18
50	13	91	7
51	15	92	11
52	11	Greater than 92	22
53	12		
54	8	Run Total	1,913
55	3		
56	5		
57	7	<u>Sex composition data</u>	
58	10		
59	12	238 Jacks	
60	7	916 Adult Males	
61	19	<u>759 Females</u>	
62	23	1,913 Fun total	
63	46		
64	50		
65	43	<u>Chinook Age Class Data</u>	
66	78		
67	75	238 Three-year-olds	
68	91	1,254 Four-year-olds	
69	113	<u>421 Five-year-olds</u>	
70	127		
71	97		
72	106		
73	73	<u>Age Determination Structure</u>	
74	69		
75	42	0 - 53 cm = Three-year-old	
76	34	54 - 80 cm = Four-year-old	
77	32	81 - > cm = Five-year-old	
78	22		
79	33		

RAPID RIVER SPRING CHINOOK - 1991 LENGTH FREQUENCY (FORK LENGTH cm)

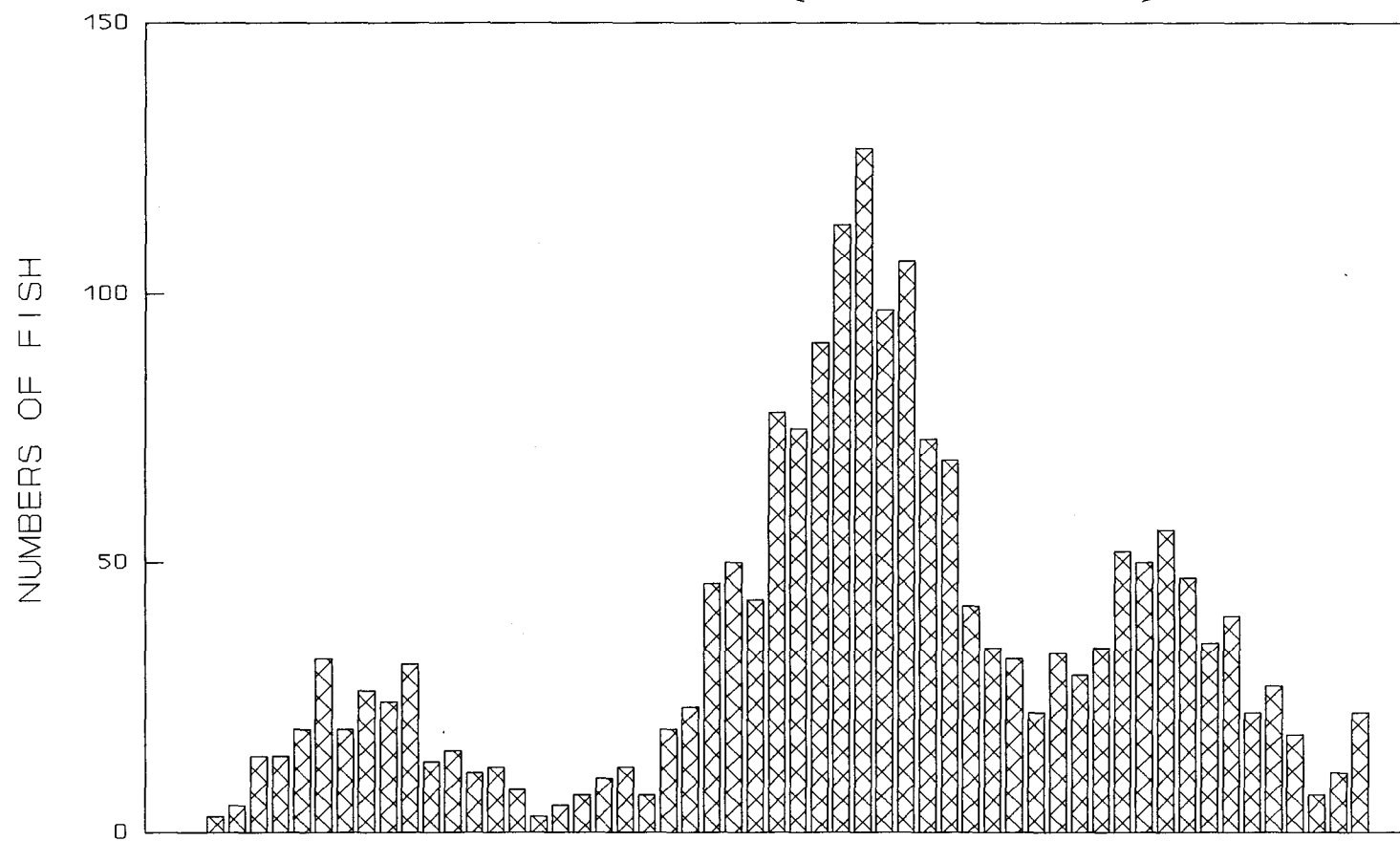


Figure 2. Spring chinook length frequency, 1991.

Table 6. Rapid River summer chinook length frequency data, 1991.

Fork length (cm)	Number of fish	Fork length (cm)	Number of fish
Less than 40		80	1
40		81	4
41	1	82	2
42	1	83	2
43		84	4
44		85	3
45		86	2
46	2	87	2
47	3	88	3
48	2	89	1
49		90	1
50	1	91	2
51	2	92	
52		Greater than 92	2
53			
54	1	Run total	153
55	1		
56			
57		<u>Sex Composition Data</u>	
58	3	12 Jacks	
59		109 Adult Males	
60	1	32 Females	
61		<u>153 Run Total</u>	
62	7		
63	5		
64	5		
65	4		
66	4		
67	2		
68	11		
69	8		
70	11		
71	5		
72	9		
73	11		
74	8		
75	7		
76	2		
77	2		
78	3		
79	2		

RAPID RIVER SUMMER CHINOOK - 1991 LENGTH FREQUENCY (FORK LENGTH cm)

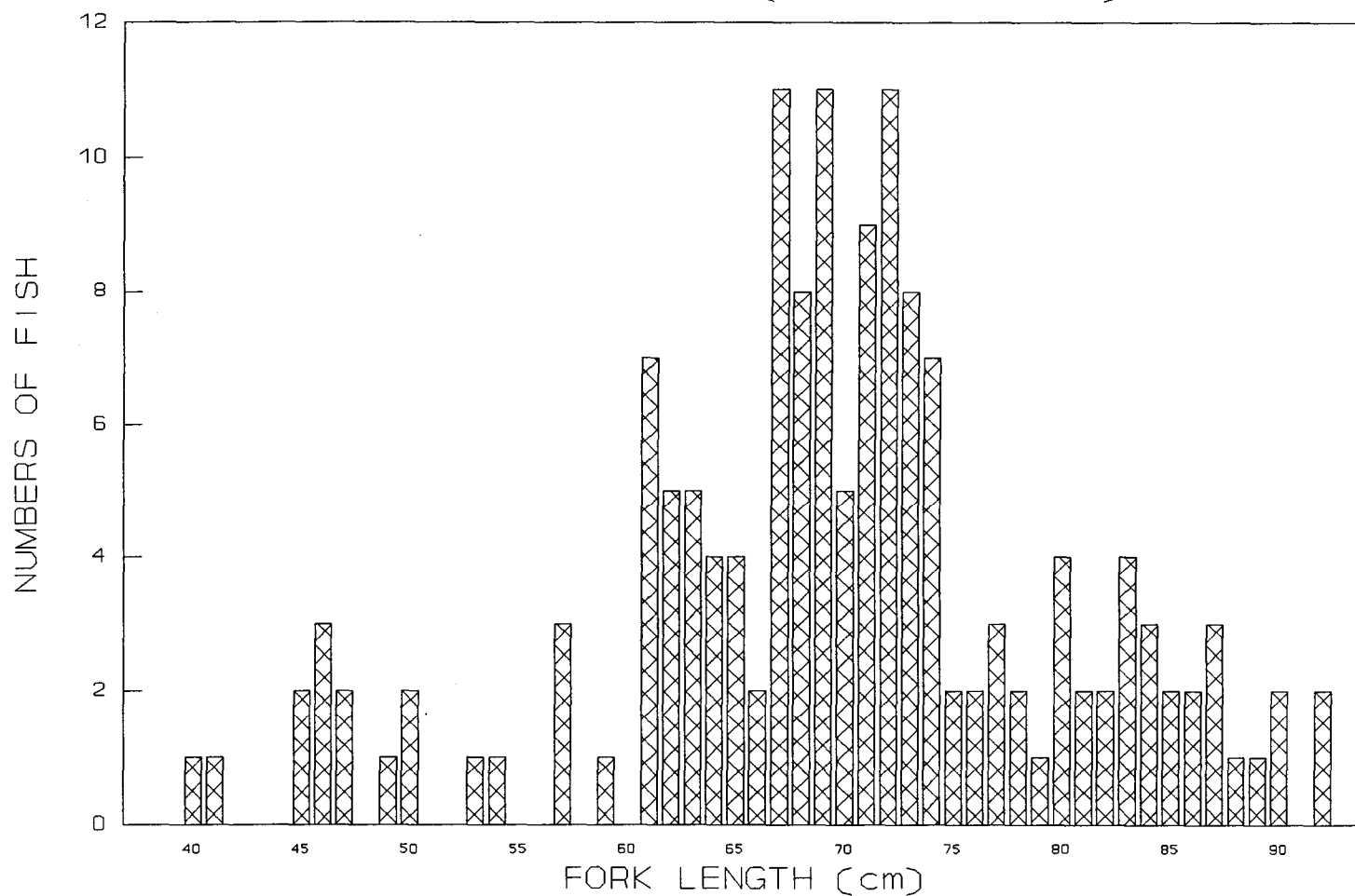


Figure 3. Summer chinook length frequency, 1991.

From April 25 through June 26, 1991, 47 adult steelhead *O. mykiss* were trapped and measured to the nearest centimeter fork length. Of the total, 46 were wild fish and 1 was of hatchery origin. The sex composition ratio was 7 adult males and 39 females of wild origin, and 1 female of hatchery origin. The hatchery fish was transported to the Little Salmon River and released approximately one mile upstream from the confluence with Rapid River. All of the wild steelhead were transported and released back into Rapid River upstream from the hatchery water intake structure. Length frequencies are shown in Table 7 and Figure 4. Scale samples were taken from all wild steelhead.

Other species trapped included 326 bull trout *Salvelinus confluentus* ranging in size from 30 to 60 cm total length. Length frequencies are shown in Table 8 and Figure 5. Five whitefish *Coregonus sp.* were also transported and returned to Rapid River upstream from the hatchery water intake structure. The total inventory of miscellaneous species is summarized in Table 9.

Harvest Data/Sport and Tribal Fishery

Due to the low number of spring chinook salmon returning to Rapid River in 1991, no sport or Tribal fishery was opened. Nez Perce Tribal officials did receive 60 uninjected jack spring chinook salmon from the hatchery due to the number of jacks taken being in surplus of hatchery needs.

Holding and Spawning

Adult Treatments

All chinook salmon, except for 60 excess jacks given to Nez Perce Tribal officials, were given a subcutaneous injection of water-soluble Erythromycin phosphate at rate of 9 mg active Erythromycin per kilogram of fish. Powdered Erythromycin Phosphate (80% active) was used to make the injectable solution.

Formalin treatments on ponded chinook salmon were administered from June 17 through August 23, 1991 to help retard fungal growth. Treatments with formalin were done three alternating days each week at a concentration of 80-100 ppm. This was effective in reducing fungal and parasitic problems. Throughout the holding/spawning period, water temperatures ranged from 39°F to 60°F degrees (Table 10).

Prespawning Mortality

A total of 1,834 spring chinook salmon were held at Rapid River Hatchery this year. This total does not include 19 trap mortalities or 60 uninjected spring chinook salmon jacks which were turned over to Nez Perce Tribal officials. All of these chinook were trapped in Rapid River, with no chinook coming from Hells Canyon. All of the spring chinook salmon were held in Adult Holding Pond #2.

Prespawning mortality in 1991 was 183 fish (9.9% of the run total, disallowing 60 jacks turned over to Tribal members). Serious Bacterial Kidney Disease (BKD) lesions were visible in five of these fish, and accounted for 2.7% of the prespawning mortalities. The prespawning loss composition ratio, by sex, was comprised of 73 adult males (39.9%), 95 females (51.9%), and 15 jacks (8.2%). The cut-off date used for segregating male prespawning mortality was August 27,

Table 7. Rapid River adult steelhead length frequency data, 1991.

Fork length (cm)	Wild origin		Hatchery origin	
	Male	Female	Male	Female
50				
51		1		
52				
53				
54				
55				
56		1		
57				
58	1		1	
59				
60				
61	1		2	
62				
63				
64	1			
65		1		
66				
67				
68		1		
69		1		
70		4		
71				
72	1		3	
73		3		
74		5		
75		1		
76		4		
77				
78	1		5	
79	1		1	
80	1		4	
81		1		
82		1		
Totals	7	39	0	1

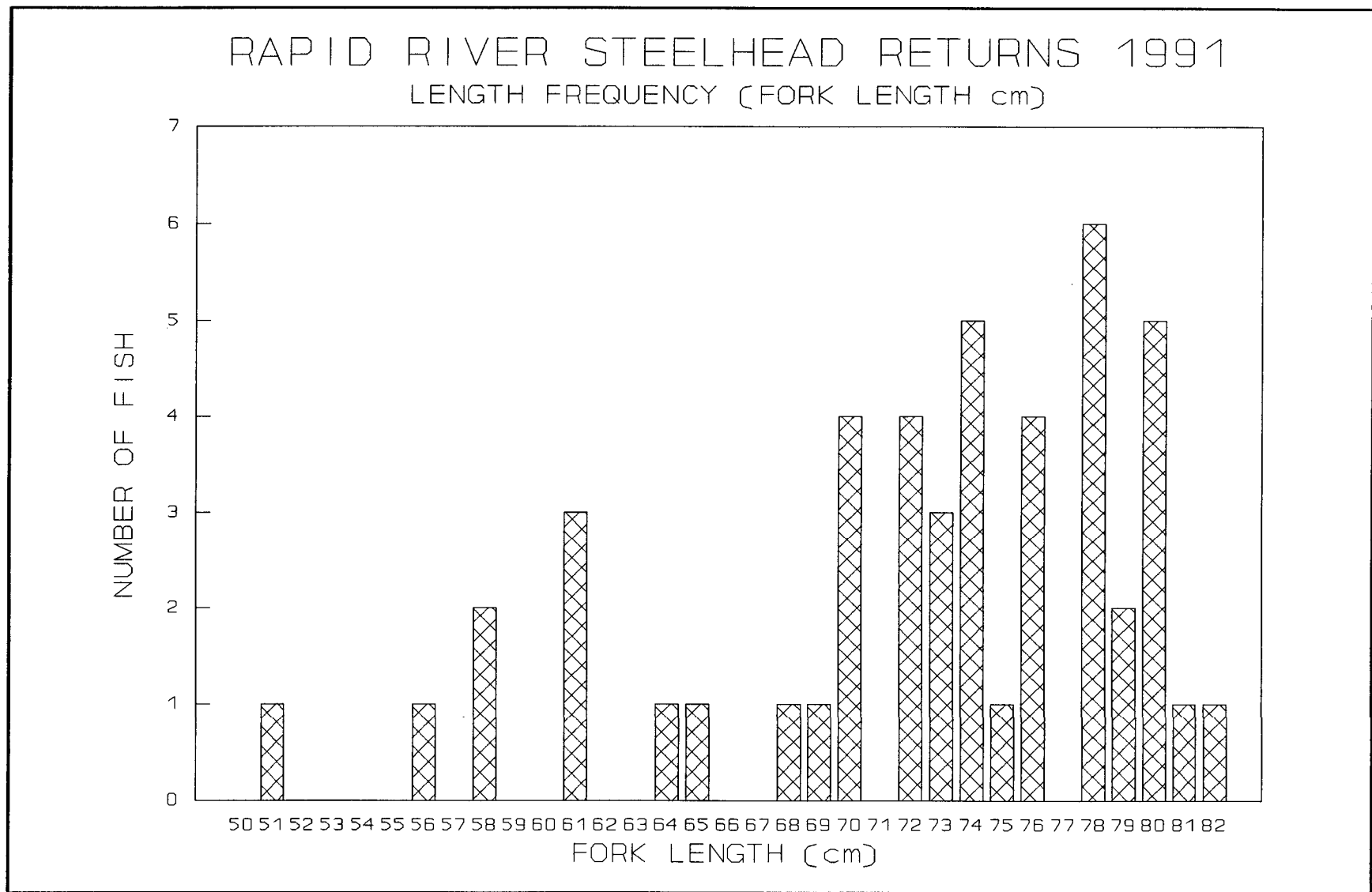


Figure 4. Steelhead length frequency, 1991.

Table 8. Rapid River bull trout length frequency data, 1991.

Total length (cm)	Number of fish
30	14
31	6
32	8
33	5
34	13
35	7
36	10
37	22
38	9
39	14
40	10
41	16
42	10
43	16
44	15
45	13
46	8
47	9
48	5
49	14
50	6
51	7
52	4
53	2
54	2
55	3
56	3
57	2
58	1
59	1
Total Data Set ^a	255

^a Of 326 bull trout trapped in Rapid River during 1991, 255 were measured.

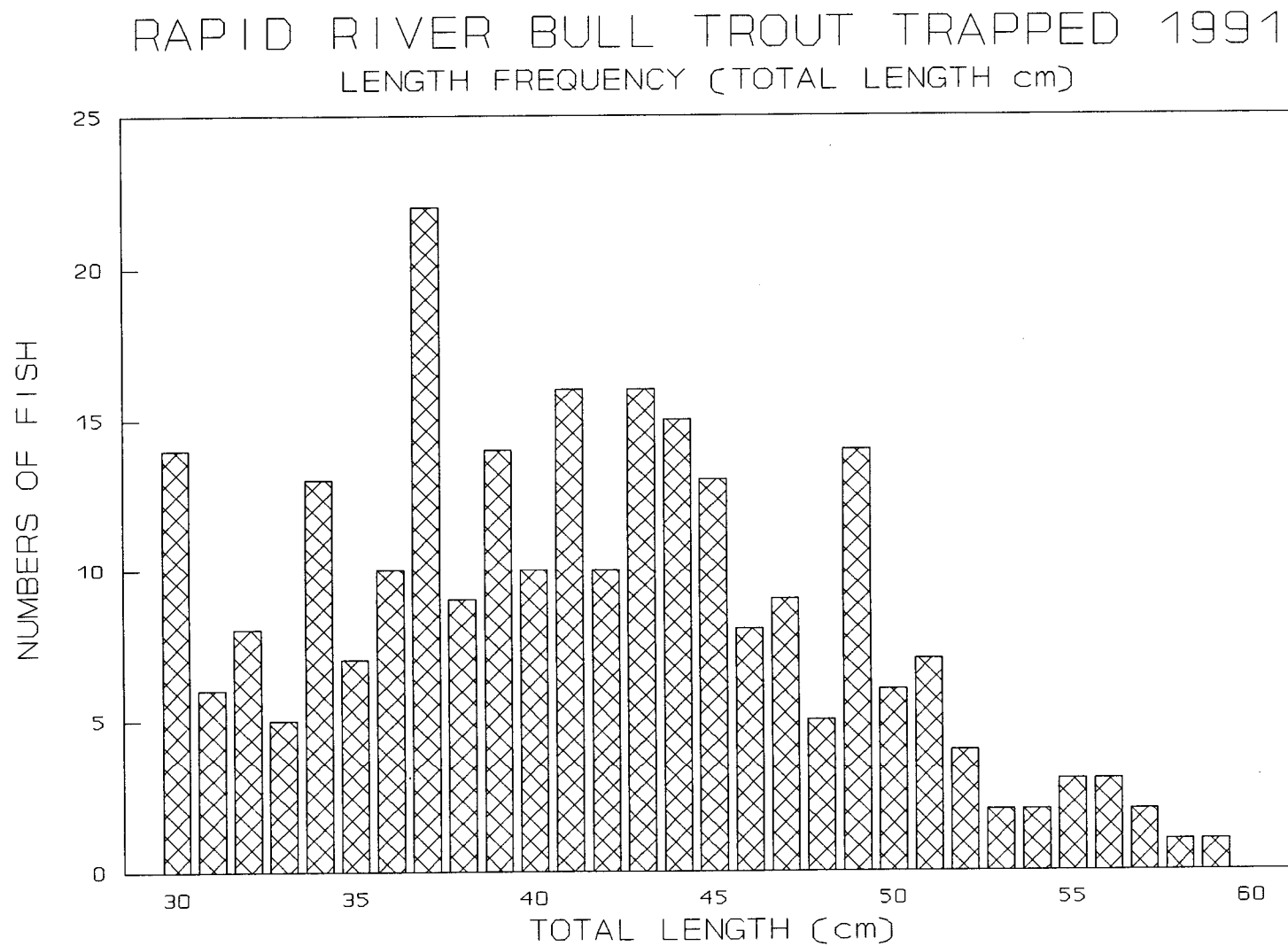


Figure 5. Bull trout length frequency, 1991.

Table 9. Inventory of miscellaneous species trapped, 1991.

Species	Number trapped
Summer chinook	150
Steelhead	47
Bull trout	326
Whitefish	5

Table 10. Average water temperatures, May through September, 1991.

Month	Maximum	Minimum	Average
May	51	39	44.5
June	52	40	46.9
July	60	46	53.6
August	60	51	55.3
September	57	46	51.7

Spring Chinook Salmon spawning

During 1991, 657 female spring chinook salmon were spawned yielding approximately 2,553,218 green eggs which had an average eye-up rate of 94.50%. Fecundity averaged 3,886 eggs per female throughout the spawning season. Egg collection began on August 13 and was completed on September 17, 1991. During this time, a total of seven females were not utilized for spawning due to poor egg quality, bloody ovarian fluid, gross symptoms of BKD, etc.

Spawning procedures used in 1991 were conducted to insure a 1:1 ratio of males to females. Spawning methodology started with placing the eggs from two females into a colander to drain off ovarian fluid. The eggs were then transferred to a bucket, fertilized with milt expressed from two males, and then mixed with approximately one cup of well water to activate the sperm. In spawning, 20 of the jacks collected were used at random in the fertilization process. Each bucket of eggs was then water-hardened for 30 minutes in a stock solution of buffered Argentyne at a minimum concentration of 100 ppm. Heath vertical stack incubators were used for incubation.

Due to the low numbers of eggs taken at Rapid River Hatchery, additional eggs were obtained from Pahsimeroi Hatchery and Oregon's Lookingglass Hatchery. Pahsimeroi Hatchery provided approximately 22,235 green eggs which were fertilized at Rapid River Hatchery. Oregon's Lookingglass Hatchery transferred approximately 26,694 eyed eggs to this station.

All non-salvageable carcasses from spawning and daily mortalities were collected twice a week and hauled to a landfill near Grangeville, Idaho by the

Walco Company. One salvageable uninjected trapping mortality was donated to the Riggins food bank on September 30, 1991. Sixty uninjected spring chinook jack salmon were transferred to Nez Perce Tribal officials on July 30, 1991 for distribution among Tribal members.

Incubation

Beginning on the fourth day of incubation, all egg lots were treated with Formalin to retard fungal development. Treatments were administered 3 times/week at a 1:600 concentration (1,667 ppm) for 15 minutes and continued until each egg lot accumulated 800 thermal units (TU).

Eye-up occurred at approximately 500 TU, at which time all egg lots were shocked and picked two days later using the salt bath floatation method. Once picked, eggs were enumerated using a "Jensorter" electronic counter. Egg trays were "rodded" weekly, after 300 TU, to remove silt accumulations.

Complete hatch occurred at approximately 1,000 TU, at which time all egg lots were picked a second time. All trays were picked a third time when 1,500 TU had been accumulated to remove any dead yolk-sac fry. Swim-up fry were at 1,550 to 1,950 TU. Survival for green eggs taken at Rapid River Hatchery to swim-up fry averaged 93.3% (Table 11).

Table 11. Survival from green eggs to swim-up fry, brood year 1991.

Hatchery source	Green eggs	Eyed eggs	Percent eye-up	Swim-up fry	Percent ^a survival
Rapid River	2,553,218	2,412,840	94.5	2,381,680	93.3
Pahsimeroi	22,235	15,584	70.1	13,858	62.3
Lookingglass	N/A	26,694	N/A	26,574	99.6

^a Percent survival is from eye to hatch.

Early Rearing

During the period of January 16 through March 5, 1992, approximately 2,422,000 fry were moved out of the incubation building into rearing raceways. Average size at the time of transfer was 1,430 fish per pound. Initial loading densities ranged from 378,000 to 418,800 fish per raceway, with an initial water depth of 1.5 feet and water flow adjusted to 0.6 cfs. As fish size increased, water depth and flows were adjusted to a maximum depth of 3 feet and flow of 1.9 cfs. Density and flow indices were kept below 0.5 and 1.0, respectively, throughout most of the initial rearing period. One raceway did exceed these values slightly for a period of one week prior to being marked and transferred to rearing ponds. Fry size increased to an average size of 2.53 inches (184.8 fish per pound), with a feed conversion of 0.99 during the raceway rearing period.

Final Rearing

New fish marking protocols required the adipose fin to be removed and a coded wire tag to be inserted in all brood year 1991 hatchery salmon. Hatchery inventory numbers were adjusted to correspond to the physical count obtained as fish were marked/ponded into final rearing ponds. A total of 2,299,023 spring chinook were transferred from the raceways to the final rearing ponds from June 8 through July 2, 1992. An additional 100,367 spring chinook fry remained in raceway 5 until they could be outplanted for supplementation purposes on July 23, 1992. Initial pond loading densities are presented in Table 12. Prior to ponding fish, rearing ponds were disinfected with a 200 ppm chlorine bath. Final rearing densities prior to release are presented in Table 13.

Table 12. Initial pond loading densities, June, 1992.

Pond	Inflow (cfs)	Millions of fish	Fish per pound	Density index	Flow index
Pond 1A	6.25	0.57	170.4	0.05	0.47
Pond 1B	6.25	0.58	180.7	0.04	0.46
Pond 2A	5.60	0.67	196.0	0.06	0.56
Pond 2D	5.76	0.47	196.0	0.05	0.38

Table 13. Rearing Densities at time of smolt release, April 1993.

Pond	Inflow (cfs)	Number of fish	Fish per pound	Density index	Flow index
Pond 1A	6.16	560,900	22.56	0.16	1.69
Pond 1B	6.14	575,100	23.88	0.16	1.70
Pond 2A	5.54	665,300	26.80	0.23	1.99
Pond 2D	6.56	459,300	26.83	0.15	1.13

Feed Use and Conversion Data

A total of 174,370 pounds of BioProducts™ feed was used for 1991 brood year fish and fry transfers. This total is comprised of 2,420 pounds of BioDiet™ feed and 171,950 pounds of BioMoist™ feed. Specific data on feed types and sizes used is listed in Table 14. The overall feed conversion for 1991 brood year spring chinook was 1.72.

Table 14. Rapid River Hatchery feed cost analysis for brood year 1991.

Feed size	Pounds purchased	Unit price	Total cost
No. 2 Starter	836	\$0.84	\$703
No. 3 Starter	1,584	\$0.84	\$1,332
1.0 mm Grower, 4.5% Galli	2,800	\$0.91	\$2,555
1.3 mm Grower	4,500	\$0.52	\$2,340
1.3 mm Grower, 2% TM	2,500	\$0.67	\$1,665
1.5 mm Grower	11,000	\$0.52	\$5,720
2.5 mm Grower, Vit Pack	15,000	\$0.44	\$6,525
2.5 mm Grower, Vit Pack with 4.5% Galli	13,150	\$0.82	\$10,750
2.5 mm Grower, Vit Pack with 2% TM	23,100	\$0.58	\$13,421
3.0 mm Grower VitPack	99,900	\$0.44	\$44,200
Hatchery totals	174,370 ^a		\$89,211

^a This number represents the entire amount of feed purchased for Rapid River Hatchery brood year 1991 through April 15, 1993 production and for stock reared at Rapid River Hatchery and outplanted as fry/fingerling releases.

Total costs paid by IPC to operate Rapid River Hatchery during the period September 1, 1991 through April 15, 1993 was \$674,615. These costs include fish feed, smolt transportation, fish marking, hatchery personnel salaries, and operation/maintenance costs. No capital outlay expenditures are included in this total. The resulting cost per pound of 1991 brood year spring chinook salmon produced at Rapid River Hatchery was \$7.36/lb (\$0.298 per smolt released).

Fish Health

Diseases Encountered and Treatment

In past years, Rapid River Hatchery experienced fish health problems by concomitant infections of Bacterial Kidney Disease *Renibacterium salmoninarum* (BKD), Bacterial Coldwater Disease *Flexibacter psychrophilus* (BC), and Erythrocytic Inclusion Body Syndrome Virus (EIBS). The effects of EIBS on long-term fish health is obscure, but the effects of BKD and BC can be acute or chronic. The primary etiologic agent at Rapid River is BKD, while BC would be considered the second priority agent. EIBS has been associated with elevated mortalities, anemia, and secondary mycotic infection (fuzzytail). In prior years, 150,000 to 200,000 fish were lost to the "fuzzytail" syndrome.

Brood year 1991 were treated twice with Erythromycin (21-day treatment at 100 mg/kg/day), and upon identification of BC, two treatments of Oxytetracycline

were applied (21-day treatment at 4.5%/100 lb). "Fuzzytail" was not an apparent problem in these fish. No control groups were maintained because this was a clinical problem, not a scientific problem.

First Preliberation

Sixty fish were sampled on February 25, 1993.
5/60 fish positive for BKD via FAT.
2/4 pools positive BKD via ELISA.

One pool measured high optical density at 1.501, while one pool was low at 0.112, and two were negative. All fish still had parr markings.

Second Preliberation

Sixty fish were sampled on March 29, 1993.
13/60 fish positive BKD via FAT.
4/12 pools positive BKD via ELISA.

One pool measured high optical density at 2.046, and three pools at low; 0.258, 0.231, and 0.157. One fish had a kidney abscess. All 60 fish appeared silver and had lost their parr markings.

Third Preliberation

Sixty fish were sampled on April 6, 1993.
0/60 fish positive BKD via FAT.
ELISA not complete at present.

All fish sampled appeared silver without parr markings.

Acute Losses

No acute losses were experienced at Rapid River Hatchery this year.

Other Assessments

According to Doug Munson, IDFG Fish Pathologist, the 1991 Rapid River Spring chinook have been the healthiest fish released from Rapid River Hatchery in many years. As stated earlier, "fuzzytail" was almost non-existent (as compared to previous years). Preliberation results support this evaluation. For the first time since ELISA has been used at Rapid River Hatchery, negative optical densities were measured. Subsequent samples showed elevated BKD positives (second preliberation). Although it is not possible to prove that this was actually exacerbated by the delay in release, further horizontal transmission is undoubtedly occurring, with repercussions which will not be realized until after the release. In the third preliberation, no positives for BKD were found. This could be attributed to either sampling or the number of BKD positive animals were greatly reduced (due to die-off). If the latter is correct, then a higher degree of horizontal transmission most likely occurred in this population.

In December of 1991, EIBS (6/10) was identified in blood smears of 1991 Rapid River spring chinook. A subsequent sample was taken during the preliberation evaluation; 21/55 fish were positive. These fish appeared to be healthy other than an anemia. There was no increase in mortality nor an increase in incidence of "fuzzytail." Although the impact seemed to be negligible from this infection, further efforts are needed to eliminate this potential problem from the Rapid River spring chinook stock. This might be achieved through further improvements in diet, ponds, water source, and fish management.

Further amelioration to fish health at Rapid River can be achieved by continuing with intraperitoneal injections of Erythromycin into brood fish, treating both BKD and BC as priorities. Develop funding to correct better crowding devices for brood fish and, in general, improvement of holding facilities and spawning area for brood fish. A BKD segregation program will be initiated at Rapid River in 1993, thus a BKD strategy for rearing and release should be developed and implemented. Improvements to the juvenile rearing ponds should be constructed to enhance circulation and flow. This would lessen the effects of BC. Preliberation autopsy summary data sheets are available at Rapid River Hatchery and Eagle Fish Health Laboratory. A summary of Eagle Health Laboratory disease sample results for brood year 1991 are presented in Table 15.

Fish Marking

All spring chinook salmon reared for release as smolts in Rapid River and Hells Canyon were adipose-clipped and CWT. A portion of the CWT spring chinook were magnetized in accordance with the US/Canada treaty. These fish will serve as one of the indicators of Idaho's contribution to salmon ocean harvest. Coded wire tags and Passively Induced Transponder (PIT) tags were used during this project. Specific marking data is presented in Table 16.

Fish Distribution

Egg Transfers

In 1991 no eggs were transferred from Rapid River Hatchery.

Fingerling Transfers

On May 15, 1992, approximately 3,050 fry were transferred to the Hayden Creek Experimental Hatchery for use by the University of Idaho. These fish averaged 350.9 fish per pound (48.0 mm fork length).

On July 23, 1992, approximately 100,251 fry were outplanted in Squaw Creek and White Sands Creek for supplementation purposes. At the time of release, these spring chinook averaged 133.42 fish per pound (64.8 mm fork length). Specific fingerling transfer data is presented in Table 16 and Appendix 4.

Table 15. Eagle Health Laboratory disease sample results for brood year 1991 juvenile spring chinook salmon.

Stock	Log #	IHN	IPN	EIBS	BKD	CWD	WHD	Comments
1991 Rapid River spring chinook	92-15	-	-	0	0	0	0	Viro 0/5
1991 Rapid River spring chinook	92-157	-	-	0	0	+	0	1/4 <u>Flexibacter</u> viro 0/10
1991 Rapid River spring chinook	92-200	-	-	0	-	+	0	BK (FAT) 0/10 viro 0/10, BC 1/4
1991 Rapid River spring chinook	92-390	-	-	-	-	0	+	BK (FAT) 0/12, VE 0/12, viro 0/10 Myxobolus 1/2 + pools
1991 Rapid River spring chinook	92-494	-	-	+	-	-	0	VE 6/10, viro 0/10 BK (FAT) 0/10
1991 Rapid River spring chinook	93-49	-	-	+	+	0	0	VE 21/55, BK (ELISA) 2/4 + pools, 1 low, 1 high; BK (FAT) 5/60
1991 Rapid River spring chinook	93-88	-	-	+	0	0	0	BK(ELISA) 4/12 +pools BK (FAT) 13/60+; viro 0/60.
1991 Rapid River spring chinook	93-103							Unavailable

IHN = Infectious Hematopoietic Necrosis

IPN = Infectious Pancreatic Necrosis

EIBS = Erythrocytic Inclusion Body Syndrome

BKD = Bacterial Kidney Disease - RS

CWD = Bacterial Coldwater Disease - *Flexibacter psychrophilus*

WHD = Whirling Disease - *Myxobolus cerebralis*

Table 16. Brood year 1991 marking summary, CWT releases.

Release site	Date released	Number marked fish released	Release group mark code	Clip	Purpose	Experiment number
Rapid River	4/14-19/93	333,642	10/36/01	AD	U.S. Canada	93RR-01
Rapid River	4/14-19/93	311,700	10/49/01	LV	Evaluation	93RR-01
Total Group Release		665,301				
Rapid River	4/14-19/93	110,086	10/49/06	LV	Contribution	93RR-02
Rapid River	4/14-19/93	110,382	10/49/07	LV	Contribution	93RR-02
Rapid River	4/14-19/93	215,026	10/49/17	AD	Contribution	93RR-02
Rapid River	4/14-19/93	54,636	10/49/20	AD	Contribution	93RR-02
Rapid River	4/14-19/93	53,941	10/49/21	LV	Contribution	93RR-02
Total Group Release		560,898				
Rapid River	4/14-19/93	113,462	10/49/08	AD	Contribution	93RR-03
Rapid River	4/14-19/93	108,975	10/49/09	AD	Contribution	93RR-03
Rapid River	4/14-19/93	111,730	10/49/10	AD	Contribution	93RR-03
Rapid River	4/14-19/93	112,017	10/49/11	LV	Contribution	93RR-03
Rapid River	4/14-19/93	54,890	10/49/22	AD	Contribution	93RR-03
Rapid River	4/14-19/93	56,770	10/49/23	LV	Contribution	93RR-03
Total Group Release		575,097				
Rapid River	4/16-19/93	251,234	Blank Wire	AD	ID.	93RR-04
Total Group Release		259,004				
Rapid River Release		2,060,300				
Snake River	4/16/93	194,291	Blank Wire	AD	ID.	93RR-05
Total Group Release		200,300				
Hells Canyon Release		200,300				
Squaw Creek	7/23/92	10,126	Untagged	RV	Contribution	93RR-06
White Sands	7/23/92	90,125	Untagged	RV	Contribution	93RR-07
Total Hatchery Release		2,360,851				

Table 17. Brood year 1991 marking summary, PIT tag releases.

Release site	Date released	Number marked fish released	Release group mark code	Clip	Pit tag code
Rapid River	4/17/91	50	10/49/08, 09,10,11, 22, &23	AD	DAC93062.1BA
Rapid River	4/17/91	51	10/49.08, 09,10,11 22,23,& untagged	LV	DAC93062.1BL
Rapid River	4/17/93	50	10/49/17, 10/49/20	AD	DAC93063.1AA
Rapid River	4/17/93	50	10/49/07 10/49/21	AD	DAC93063.1AL
Rapid River	4/17/93	50	10/49/01	LV	DAC93063.2AL
Snake River	4/16/93	50	Blankwire	AD	DAC93063.HDA
Snake River	4/16/93	50	Blankwire	AD	DAC93063.HEL
White Sands Creek	7/23/92	700	untagged	RV	EJL92191.BFC
Squaw Creek	7/23/92	700	untagged	RV	EJL92191.SQC
White Sands Creek	7/23/92	700	untagged	RV	EJL92191.WSC
Rapid River	4/17/93	1486	10/49/07, 08,09,10, 11,17,20, 21,22,23	LVAD	LRB93062.RAF
Rapid River	4/17/93	38	10/49/07, 08,09,10, 11,17,20, 21,22,23	LVAD	LRB93062.RHF
Total PIT tags		4,025			
Total Hatchery Release		2,360,851			

Smolt Releases

Volitional smolt releases from Rapid River Hatchery began on April 14, 1993, about one month later than in previous years. Smolts averaged 24.7 fish per pound and 120.0 mm fork length. Rearing densities for smolts at time of release is listed in Table 13.

Based on visual observations, it is estimated that less than 365,000 fish remained in the rearing pond by April 19, 1993. Smolts after this date were actively seined out of the ponds. The last few thousand smolts were netted from Pond 1 and Pond 2 when they were dewatered on April 21 and 22, respectively. The total smolt release into Rapid River numbered approximately 2,060,300 spring chinook which averaged 24.7 fish per pound (119.7 mm fork length). Spring chinook in the rearing ponds were not fed after April 5, 1993 due to uncertainty about release approval and time constraints involved in receiving a feed shipment. Planting sites and numerical data for brood year 1991 smolts is presented in Table 18.

Idaho Power Company transport tankers outplanted Rapid River spring chinook stock, numbering 200,300 smolts, into the Snake River directly below Hells Canyon Dam on April 16, 1993. These spring chinook smolts averaged 26.8 fish per pound at a fork length size of 119.4 mm. No magnetized CWT smolts and 100 PIT-tagged smolts were included in this release group (Table 16 and 17).

Table 18. Smolt releases, brood year 1991.

Date	Plant site	Number released	Fish per pound
Snake River			
04-16-93	Below Hells Canyon Dam	200,300	26.8
Subtotal		200,300	
Rapid River			
04-14-93	Volitional Release Pond 1A	532,900	22.6
04-14-93	Volitional Release Pond 1B	460,100	23.9
04-14-93	Volitional Release Pond 2A	499,000	26.8
04-16-93	Volitional Release Pond 2D	207,200	26.8
04-19-93	Smolts Flushed Pond 1A	28,000	22.6
04-19-93	Smolts Flushed Pond 1B	115,000	23.9
04-19-93	Smolts Flushed Pond 2A	166,300	26.8
04-19-93	Smolts Flushed Pond 2D	51,800	26.8
Subtotal		2,060,300	
Hatchery total		2,260,600	

ACKNOWLEDGEMENTS

The crew at Rapid River Hatchery would like to thank Paul Abbott and the entire fisheries staff at Idaho Power Company for their support and assistance in helping us to maintain and improve the hatchery facility. We would also like to thank personnel from other hatcheries (especially Brent Snider) and U.S. Forest Service personnel who helped us take eggs during the spawning season. Our gratitude goes to Roy Kinner and other area conservation officers for helping with enforcement problems at the hatchery and for security at the trapping facility. In addition, we extend our appreciation to Doug Munson and the Eagle Laboratory pathology staff for doing disease diagnostic work at the hatchery. Finally, a mile post, the release of brood year 1991 in the spring of 1993 marks the retirement of Thomas Levendofsky. Tom was the Hatchery Manager here for 13 years. The staff here wishes him well in his retirement from Idaho Fish and Game, and thanks for his contribution to the organization and the resource. This team effort helps to keep Rapid River a successful hatchery operation.

A P P E N D I C E S

Appendix 1. Returns of spring chinook to Rapid River Hatchery and enumeration of eggs, 1964-1991.

Return year	SNAKE River returns	Rapid River returns	Rapid River returns	Percent prespawn mortality	Females spawned	Eggs/female	Number of eggs taken
1964	349	16	182	4,874	887,000		
1965	408	21	133	4,541	604,000		
1966	1,511	18	621	3,697	2,296,000		
1967	974	1,039	11	581	3,537	2,055,000	
1968	351	3,416	740	2	1,809	3,671	6,540,000
1969	672	2,817	1,043	8	1,415	3,655	5,151,697
1970		6,470	887	10	3520	4,136	14,560,280
1971		3,357	1,754	19	1,722	3,507	6,038,785
1972		12,310	943	15	3,825	3,941	15,072,604
1973		17,054	286	37	3,454	3,912	13,510,465
1974		3,457	538	27	1,756	3,924	6,890,186
1975		4,428	573	7	2,184	3,894	8,503,606
1976		6,342	1,765	15	3,055	3,762	11,492,878
1977		7,767	437	11	3,781	3,745	14,160,330
1978		5,735	34	21	2,350	4,266	10,026,888
1979		3,054	350	31	1,141	4,950	5,648,722
1980		1,528	432	30	543	3,235	1,756,827
1981		3,087	176	7	1,666	3,675	6,122,273
1982		3,646	30	11	1,883	3,973	7,482,330
1983		1,864	94	15	859	4,015	3,449,471
1984		1,705	651	7	821	3,807	3,125,911
1985	673	6,376	351	8	2,962	3,741	11,535,461 ^a
1986	360	6,546	177	34	2,451	4,355	10,673,138 ^a
1987	534	3,808	210	30	1,133	4,379	5,656,145 ^a
1988	381	3,608	172	19	1,645	4,879	7,905,702 ^a
1989	86	2,372	428	11	1,082	4,139	4,478,045 ^a
1990		2,566	40	13	1,063	3,967	4,217,103
1991		1,675	238	10	657	3,886	2,553,218
1992	912	2,370	96	24	1,177	3,853	4,534,400 ^a
1993	411	4,451	17	17	1,737	N/A	N/A

^a Includes eggs taken from Hells Canyon adults.

Appendix 2. Summary of spring chinook returns to Rapid River by brood year.

Brood year	Year released	Number released	3-year-olds	Year returned	4-year-olds	Year returned	5-year-olds	Year returned	Total brood year return	Percent return from plant
1964	1966	588,000	1,309	1967	3422	1968	197	1969	4,658	0.80
1965	1967	479,267	740	1968	2,620	1969	874	1970	4,234	0.89
1966	1968	1,460,150	1,043	1969	5,596	1970	364	1971	7,003	0.48
1967	1969	900,192	887	1970	2,992	1971	1,544	1972	5,416	0.60
1968	1970	3,172,000	1,754	1971	10,766	1972	4,403	1973	16,923	0.53
1969	1971	2,718,720	943	1972	12,654	1973	1,759	1974	15,356	0.56
1970	1972	2,809,200	285	1973	1,698	1974	386	1975	2,370	0.08
1971	1973	2,908,425	538	1974	4,206	1975	1,120	1976	5,864	0.20
1972	1974	2,707,917	573	1975	5,222	1976	634	1977	6,429	0.24
1973	1975	3,373,700	1,765	1976	7,110	1977	1,845	1978	10,720	0.32
1974	1976	3,358,940	437	1977	3,890	1978	2,413	1979	6,740	0.20
1975	1977	2,921,172	34	1978	598	1979	46	1980	678	0.02
1976	1978	2,413,678	350	1979	1,482	1980	146	1981	1,978	0.08
1977	1979	2,866,993	432	1980	3,068	1981	557	1982	4,057	0.14
1978	1980	2,604,823	176	1981	3,089	1982	1,206	1983	4,291	0.16
1979	1981	2,372,607	30	1982	838	1983	356	1984	1,224	0.05
1980	1982	1,473,733	94	1983	1,349	1984	199	1985	1,642	0.11
1981	1983	2,998,103	651	1984	6,177	1985	1,456	1986	8,284	0.28
1982	1984	3,246,197	351	1985	5,090	1986	1,155	1987	6,596	0.20
1983	1985	2,491,238	177	1986	2,444	1987	1,557	1988	4,178	0.17
1984	1986	1,594,688	210	1987	2,051	1988	379	1989	2,640	0.17
1985	1987	2,836,400	172	1988	1,933	1989	135	1990	2,300	0.08
1986	1988	2,630,200	428	1989	2,431	1990	421	1991	3,280	0.12
1987	1989	2,319,500	40	1990	1,254	1991	161	1992	1,455	0.06
1988	1990	2,520,400	238	1991	2,209	1992	1,905	1993	4,352	0.17
1989	1991	2,564,900	96	1992	2,546	1993		1994		
1990	1992	2,615,500	17	1993		1994		1995		
1991	1993	2,060,300		1994		1995		1996		

Appendix 3. Feed and growth information based on data for spring chinook salmon at Rapid River Hatchery, 1980-1991.

Month	Average water temperature (°F)	Density index	Flow index	Feed conversion	Hatchery constant	Daily length increase	Monthly length increase	Condition factor	Percent body weight fed	Number feedings/ pound/ day	Average number/ pond at end of month	Average length at end of month
FEB	38	N.A.	N.A.	3.00	1.98	0.0022	0.07	0.00026	1.42	8	1084	1.53
MAR	41	0.25	0.54	1.30	2.85	0.0073	0.22	0.00028	1.89	8	847	1.62
APR	44	0.28	0.50	1.00	3.50	0.0117	0.35	0.00030	2.40	8	461	1.93
MAY ^a	46	0.28	0.68	2.00	4.80	0.0080	0.24	0.00032	2.30	8	293	2.25
JUN	48	0.07	0.76	1.19	7.50	0.0210	0.63	0.00033	2.93	4	141	2.87
JUL	53	0.09	0.87	1.56	7.49	0.0160	0.48	0.00033	2.75	4	79	3.48
AUG	54	0.12	1.39	1.61	8.21	0.0170	0.51	0.00035	2.70	5	49	3.88
SEP	50	0.14	1.60	1.55	9.00	0.0170	0.51	0.00035	2.00	5	36	4.30
OCT	46	0.16	1.64	2.17	6.05	0.0093	0.28	0.00035	1.37	3	30	4.57
NOV	41	0.17	1.87	3.71	1.89	0.0017	0.05	0.00035	0.41	2	29	4.62
DEC	38	0.16	1.90	4.50	0.95	0.0007	0.00	0.00035	0.21	1	30	4.57
JAN	37	0.18	1.95	4.50	0.95	0.0007	0.00	0.00035	0.21	1	30	4.57
FEB	38	0.18	2.10	2.50	2.48	0.0033	0.10	0.00032	0.53	2	27	4.87
MAR	41	0.19	1.95	1.80	4.48	0.0083	0.25	0.00032	0.92	2	23	5.14

^a Growth data may vary during periods of high water.

Appendix 4. Summary of spring chinook planted or transferred from Rapid River Hatchery 1964-1993.

Brood Year	Taken	Egg, fry, plants,& site	Smolt plants & site	Fish/ pound
1964	887,000	None	588,000 Rapid River	22.6
1965	604,000	None	479,267 Rapid River	23.2
1966	2,296,000	None	1,460,150 Rapid River	25.0
1967	2,055,000	None	900,192 Rapid River	24.0
1968	6,540,000	757,376 eggs, Clearwater Hatchery Channel	3,172,000 Rapid River	20.0
1969	5,171,697	497,000 eggs, Dworshak National Fish Hatchery to start Kooskia National Fish Hatchery	2,718,720 Rapid River	21.0
1970	14,560,280	4,417,454 eggs, Sweetwater Eye Station 2,224 eqqs, Kooskia National Fish Hatchery 526,516 eqqs, Hayden Creek Hatchery 2,473,983 eqqs, Clearwater Hatchery Channel 4,607,736 eqqs, Rapid River Hatchery 200,520 Lemhi River 353,970 Decker Pond 100,000 Sandpoint Hatchery	2,809,200 Rapid River 91,800 Lochsa River	19.4
1971	6,038,785	600,000 eggs, Hayden Creek Hatchery 53,562 Lemhi River 104,300 Red River 29,800 Ten Mile Creek 44,700 American River 14,900 Papoose Creek 59,600 Brushy Creek 44,700 Fish Creek 14,900 Post Office Creek 44,700 Squaw Creek(Lochsa) 61,500 Lochsa River 60,000 Ten Mile Creek 200,880 Sandpoint Hatchery 401,305 Decker Pond	2,908,425 Rapid River 197,303 South Fork Clearwater	17.0
1972	15,072,604	5,256,662 eggs, Sweetwater Eye Station 3,012,358 eqqs, Hayden Creek Hatchery 1,293,592 eqqs, Red River Hatchery Channel	2,707,917 Rapid River	17.5

Appendix 4. Continued.

Brood Year	Taken	Egg, fry, plants, & site		Smolt plants & site		Fish/ pound
1973	13,510,464	3,915,900	eggs, Sweetwater Eye Station	3,373,700	Rapid River	14.8
		1,295,424	eggs, Hayden Creek Hatchery	117,000	South Fork Clearwater	
		104,760	eggs, Hagerman Hatchery			
		502,200	eggs, Crooked River Hatchery Channel			
		702,000	eggs, Kooskia National Fish Hatchery			
		806,400	eggs, Hayden Creek Hatchery			
		504,000	eggs, Minnesota-walleye trade			
		210,734	fry, Sandpoint Hatchery			
		206,360	fry, Kooskia Hatchery			
		88,480	fry, Ten Mile Creek			
		18,200	fry, Newsome Creek			
		633,000	fry, Lemhi River			
		10,428	fry, Capehorn Creek			
1974	6,890,186	809,400	eggs, Hayden Creek Hatchery	3,358,940	Rapid River	18.4
		407,012	eggs, Indian Creek	205,700	South Fork Clearwater	
		203,500	fry, Sandpoint Hatchery			
		21,840	fry, Capehorn Creek			
		59,962	fry, Red River			
		30,750	fry, Newsome Creek			
		10,250	fry, Ten Mile Creek			
		1,140,300	fry, Lemhi River			
1975	8,503,606	2,363,200	eggs, Sweetwater Eye Station	2,921,172	Rapid River	15.9
		252,200	eggs, Mullan Hatchery	249,750	South Fork Clearwater	
		255,000	eggs, Hayden Creek Hatchery			
		280,659	eggs, Indian Creek Hatchery Channel			
		4,906,492	eggs, Rapid River Hatchery			
		34,000	fry, Ten Mile Creek			
		156,000	fry, Lemhi River			
		65,960	fry, South Fork Clearwater River			
		412,800	fry, Decker Pond			
		209,950	fry, Sandpoint Hatchery			
		36,143	fry, Bear Valley Creek			

Appendix 4. Continued.

Brood Year	Taken	Egg, fry, plants, & site	Smolt plants & site	Fish/ pound
1976	11,492,878	1,161,608 eggs, Mullan Hatchery 2,937,994 eggs, Sweetwater Eye Station 261,900 eggs, Hayden Creek Hatchery 261,900 eggs, Sandpoint Hatchery 1,267,208 eggs, Mackay Hatchery 47,008 fry, University of Idaho, Fish Cooperative 311,850 fry, Mackay Hatchery 104,500 fry, Lolo Creek 501,600 fry, Red River Pond 80,600 fry, South Fork Clearwater River	2,413,678 Rapid River	15.7
1977	14,160,330	2,633,400 eggs, Sweetwater Eye Station 2,287,800 eggs, Kooskia National Fish Hatchery 2,689,000 eggs, Mullan Hatchery 288,000 eggs, Hayden Creek Hatchery 20,700 eggs, University of Idaho 1,007,340 eggs, Crooked River Hatchery Channel 723,000 fry, Mackay Hatchery 50,800 fry, Decker Pond 200,025 fry, Red River Pond 265,600 fry, Lemhi River	2,866,993 Rapid River 156,362 White Sand 44,373 Newsome Creek	15.0
1978	10,026,888	767,322 eggs, Hayden Creek Hatchery 970,728 eggs, Mackay Hatchery 1,540,282 eggs, Sweetwater Eye Station 706,936 eggs, Dworshak National Fish Hatchery 38,160 eggs, University of Idaho 10,864 eggs, University of Idaho (Hayden Creek) 1,250,010 eggs, Crooked River Hatchery Channel 249,969 eggs, Sweetwater Eye Station 232,500 fry, Red River Pond 10,000 fry, Ten Mile Creek	2,604,823 Rapid River 57,440 White Sand	15.0
1979	5,646,722	806,400 eggs, Hayden Creek Hatchery 330,880 eggs, Dworshak National Fish Hatchery 293,249 fry, Red River Pond	2,372,607 Rapid River 1,001,700 Snake River	17.9 21.0
1980	1,756,827	None	1,473,733 Rapid River	28.0

Appendix 4. Continued.

Brood Year	Taken	Egg. fry. plants. & site	Smolt plants & site	Fish/ pound
1981	6,122,273	608,384 eggs, Pahsimeroi Hatchery 256,608 eggs, Oxbow Hatchery 449,280 eggs, Dworshak National Fish Hatchery	2,998,103 Rapid River 250,020 Snake River	22.0 27.0
1982	7,420,450	493,346 eggs, Lookingglass (Oregon) 1,332,000 eggs, Pahsimeroi Hatchery 375,028 eggs, Dworshak National Fish Hatchery 125,055 eggs, Haqerman National Fish Hatchery 306,000 fry, Red River Pond	3,246,197 Rapid River 500,850 Snake River	20.0 27.0
1983	3,449,471	None	2,491,238 Rapid River 437,360 Snake River	23.0 27.0
1984	3,125,911	152,000 fry, Red River 217,181*	1,594,688 Rapid River 140,000 Snake River 136,800 Red River	22.0 20.0 30.0
35 1985	11,535,461	497,520 eggs, Oregon 3,668,000 eggs, Dworshak National Fish Hatchery 2,450,907 eggs, Sawtooth Hatchery 100,590 fry, Boulder Creek 349,650 fry, Crooked River 200,158 fry, Eldorado Creek 55,123 fry, Hopeful Creek 144,443 fry, Crooked Fork 70,282 fry, White Sands Creek 49,437 fry, Ten Mile Creek 102,282 fry, Newsome Creek 115,352 fry, Brushy Fork	2,836,400 Rapid River 103,000 Snake River	22.5 31.1
1986	10,673,138	2,368,400 eggs, Dworshak National Fish Hatchery 712,905 eggs, Sawtooth Hatchery 348,600 fry, Crooked Fork 202,400 fry, White Sand Creek 98,000 fry, Big Flat Creek 238,900 fry, Red River Pond	2,630,200 Rapid River 400,600 Snake River	19.0 19.8

Appendix 4. Continued.

Brood Year	Taken	Egg, fry, plants, & site	Smolt plants & site	Fish/ pound
1987	5,656,145	30,000 fry, Little Salmon River	2,319,500 Rapid River	22.0
		103,800 fry, Lolo Creek	500,000 Snake River	20.0
		53,200 fry, El Dorado Creek		
		137,800 fry, Crooked Fork Creek		
		62,200 fry, Hopeful Creek		
		108,300 fry, White Sand Creek		
		72,200 fry, Big Flat Creek		
		19,500 fry, White Sand Creek		
		113,800 fry, American River		
		112,100 fry, Newsome Creek		
		100,100 fry, Meadow Creek		
		200,100 fry, Crooked River		
		50,100 fry, Red River		
		50,100 fry, Yankee Fork		
		202,000 fry, Brushy Fork		
		150,100 fry, Ten Mile Creek		
		100,200 fry, White Sand Creek		
1988	7,881,379	1,475,677 eggs, Oregon Department of Fish and Game	2,520,400 Rapid River	26.0
		149,570 fry, Little Salmon River	250,000 Little Salmon River	27.8
		100,278 fry, Ten Mile Creek	551,200 Snake River	30.0
		149,570 fry, Little Salmon River		
		100,278 fry, Ten Mile Creek		
		101,062 fry, Crooked River		
		100,862 fry, Crooked River		
		100,628 fry, Newsome Creek		
		100,299 fry, Boulder Creek		
		100,342 fry, Boulder Creek		
		100,097 fry, Newsome Creek		
		195,398 fry, Brushy Fork		
		99,919 fry, White Sands Creek		
		100,148 fry, White Sands Creek		
		99,401 fry, American River		
		51,369 fry, American River		
		39,163 fry, Meadow Creek		
1989	3,925,585	211,209 fry, Crooked River	2,564,900 Rapid River	24.2
		548,876 fry, Sawtooth Hatchery	100,100 Little Salmon River	22.5
			500,500 Snake River	22.5
1990	4,217,103	200,000 eggs, Lookingglass Hatchery	2,615,500 Rapid River	20.3
		403,400 fry, Sawtooth Hatchery	500,500 Snake River	20.3
1991	2,553,218	3,050 fry, Hayden Creek Hatchery	2,060,300 Rapid River	24.7
		10,126 fry, Squaw Creek	200,300 Snake River	26.8
		90,125 fry, White Sand Creek		

Submitted by:

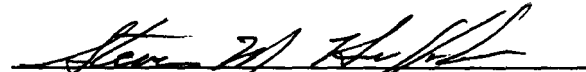
Rick Lowell
Fish Hatchery Superintendent III

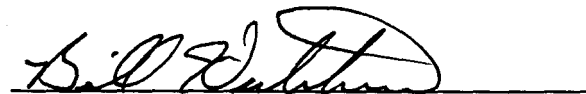
Ralph Steiner
Fish Hatchery Superintendent I

Michele Baer
Fish Culturist

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME


Steven M. Huffaker, Chief
Bureau of Fisheries


Bill Hutchinson
Fish Hatchery Manager